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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/642,919	08/18/2003	Dawn V. Muyres	58434US002	3648
32692	7590	05/02/2008		
3M INNOVATIVE PROPERTIES COMPANY				
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EXAMINER				
SUCH, MATTHEW W				
ART UNIT		PAPER NUMBER		
2891				
NOTIFICATION DATE		DELIVERY MODE		
05/02/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LegalUSDocketing@mmm.com

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Office Action Summary

Application No.

10/642,919

Applicant(s)

MUYRES ET AL.

Examiner

Matthew W. Such

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 12, 27, 29 and 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 13-26 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 May 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 2/23/05 & 3/22/04

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Invention I, Species IA, drawn to claim 1-11, 13-26 and 28, in the reply filed on 23 January 2008 is acknowledged. Accordingly, claims 12 and 29 are currently withdrawn from consideration as being drawn to Invention II, claim 30 is withdrawn as being drawn to Invention III, and claim 27 is withdrawn as being drawn to Invention I, Species IB.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the methods of depositing each of the thin film transistor layers and the "metal layer" of claim 13 (if it is a unique layer not already shown) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the

renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: the word "alipahtic" on Page 22, Line 13 should read "aliphatic".

Appropriate correction is required.

Claim Objections

4. Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The claim recites "wherein said sealing material forms a preselected pattern on at least a portion of said semiconductor layer". However, this recitation fails to further limit the previous claim because the claim does not distinguish what a "preselected pattern" is. As such, anything is a "preselected pattern". Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.
5. Claim 15 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The claim recites "wherein said

thin film transistor is part of an integrated circuit". However, this recitation fails to further limit the previous claim because the claim does not distinguish what "part" the thin film transistor is. Further, the "thin film transistor" is "an integrated circuit" by itself. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

6. Claim 16 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The claim recites "wherein said sealing material covers at least a portion of said integrated circuit". However, this recitation fails to further limit the previous claim because the sealing material is already on (covering) the thin film transistor as required by claim 1. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

7. Claim 17 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. The claim recites "wherein said sealing material covers at least a portion of conducting lines of said integrated circuit". However, this recitation fails to further limit the previous claim because the claims fail to establish that the element of "conductive lines" is a required limitation of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites the limitation "the step of vapor depositing a metal layer" in Line 2. There is insufficient antecedent basis for this limitation in the claim. Furthermore, it is unclear whether the claim actually further comprises depositing a metal layer on the sealing material or not. Clarification is required.

10. Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites the limitation "the step of interconnecting said thin film transistor" in Line 2. There is insufficient antecedent basis for this limitation in the claim. Furthermore, it is unclear whether the claim actually further comprises at least one other transistor or not. Clarification is required.

11. Claim 17 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites the limitation "of conducting lines" in Line 2. There is

insufficient antecedent basis for this limitation in the claim. Furthermore, it is unclear whether the claim actually further comprises conducting lines or not. Clarification is required.

12. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The repeated recitations of "an aperture mask" in Lines 5, 7, 9, 12 and 15 renders the claim indefinite because it is unclear whether each subsequent recitation of "an aperture mask" is intended to introduce an additional aperture mask that is separate and distinct from previous recitations of "an aperture mask" or if each recitation of "an aperture mask" is referring to the same element. Clarification is required.

13. Claim 21 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites "its" which renders the claim indefinite because it is unclear what is included and excluded from "its". Clarification is required.

14. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claim recites the limitation "the steps" in Line 1. There is insufficient antecedent basis for this limitation in the claim. Further, the recitation of "the steps" renders the claim indefinite because it is unclear what is included and excluded from "the steps". The claim

also recites "are performed in the order listed" which renders the claim indefinite because it is unclear what the order listed means, such as (a) occurs before (b), etc. Clarification is required.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. In so far as definite, claims 1-8, 13-24 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harajiri ('246) in view of Shepherd ('739).

Harajiri teaches at least a method of forming a thin film transistor by first providing a substrate (Fig. 1a; Col. 1, Line 14) and then, secondly, depositing a gate electrode (Element 1) on a substrate with a first mask (Col. 1, Line 14). Third, a gate dielectric (Element 3) is next formed on the gate electrode with a second mask (Col. 1, Lines 17-18). Fourth, a semiconductor layer (Element 4) is next formed on the gate dielectric with a third mask (Col. 1, Lines 19-21). Fifth, source/drain electrodes (Elements 5, 6) are next formed on the semiconductor with a fourth mask (Col. 1, Lines 21-23). A sealing material (Element 7) is deposited with a fifth mask (Col. 1, Lines 23-26). The thin film transistor is interconnected to other devices (such as Element 2 or other thin film transistors in an LCD display; Col. 1, Lines 5-12). However, Harajiri is silent as to whether vacuum vapor deposition is done through the masks or if the vacuum vapor

depositions are blanket deposits and the masks are used to pattern away unused portions of layers.

However, Shepherd teaches conventional vacuum vapor techniques of depositing through uniquely shaped sets of masks for forming thin film transistors (Col. 1, Lines 28-29). The thin film transistors can include a gate electrode (Element 14a), a gate dielectric (Element 18a), a semiconductor (Element 20), source/drains (Elements 24, 26), a sealing film (Element 18b), and a "metal layer" (Element 14b).

Regarding claims 1-2, 14-22 and 28, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the gate electrode, dielectric, semiconductor, source/drains, and sealing film by vacuum vapor deposition through each of the five masks. One would have been motivated to do so since Shepherd teaches that this process has specific advantages (especially over blanket deposition and patterning) such as maintaining clean interfaces, producing a transistor with better performance, since all depositions are completed in a single vacuum cycle without breaking vacuum (Col. 1, Lines 30-40).

Regarding claims 3-8, 13 and 23-24, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the "metal layer" on the sealing layer by the aperture mask in order to form a double gate structure (Shepherd Col. 4, Line 46). It would have been obvious to form the sealing layer of silicon oxide or aluminum oxide, which are transparent and have electrical resistivity of $1E6$ ohm-cm (greater than $100\times$ of semiconductor resistivity) since Shepherd teaches that these are conventional gate dielectric materials (Col. 2, Line 60; Col. 4, Lines 65-66). It has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co.*

v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07. Further regarding claim 7, parylene is only required if the sealing material is a polymer since the claim does not require "wherein said sealing material is a polymer and the polymer is parylene" but merely requires "wherein said polymer is parylene".

17. In so far as definite, claims 9-10 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harajiri ('246) in view of Shepherd ('739) as applied to claims 1 and 18 above, and further in view of Gundlach (IEEE, Vol. 18).

Harajiri in view of Shepherd does not teach pentacene as the semiconductor material, but rather, teaches using conventional inorganic semiconductor materials such as silicon or CdSe.

Gundlach teaches forming transistors with pentacene as a semiconductor material in thin film transistors. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use pentacene in place of conventional inorganic semiconductor materials. One would have been motivated to do so since Gundlach teaches that organic pentacene semiconductor materials have comparable performance with inorganic semiconductors while have advantages such as the use of inexpensive, lightweight, flexible, and mechanically rugged materials for substrates ("I. Introduction").

18. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harajiri ('246) in view of Shepherd ('739) as applied to claims 1 and 18 above, and further in view of Powell ('926).

Regarding claim 11, Harajiri in view of Shepherd does not teach the mask materials.

However, Powell teaches methods of using different masks to sequentially form a gate, dielectric, semiconductor, source/drains, and sealing layer by vapor deposition using conventional polymer masks, such as photoresist materials (Col. 4, Lines 43-59). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use polymer photoresist as the masks of Harajiri in view of Shepherd since Powell teaches these materials are functionally equivalent as masks for forming semiconductor devices (Col. 4, Lines 53-59, for example). It has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

Related Prior Art

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- a. Gutknecht ('781), Schachter ('340), Eccleston ('486), Takafuji ('572), Minezaki ('981), Poleshuk ('481 and '731) and Kamio ('692) each teach conventional methods of forming thin film transistors;
- b. Brody ('613) teaches conventional vacuum chambers for forming thin film transistors;

- c. Weimer ('061) teaches conventional thin film transistor circuits and interconnections; and
- d. Pichler ('500) teaches conventional sealing materials and methods of forming sealants for organic semiconductor devices.

Contact Information

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Such whose telephone number is (571) 272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew W. Such
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MWS
4/25/08

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